

UNDERSTANDING EARTH'S POLAR CHALLENGES: INTERNATIONAL POLAR YEAR 2007–2008.

Krupnik Igor, Ian Allison, Robin Bell, Paul Cutler, David Hik, Jerónimo López-Martínez, Volker Rachold, Eduard Sarukhanian and Colin Summerhayes (editors). 2011. Rovaniemi: University of the Arctic (digital), Edmonton: CCI Press in collaboration with University of the Arctic and ICSU/WMO Joint Committee for International Polar Year 2007–2008 (print). xxiv + 695 p, illustrated, hardcover. ISBN 978-952-484-403-1 (digital), ISBN 978-1-896445-55-7 (print). Free of charge.

Uncertainty is the driving force of science; the transmitter that moves our knowledge to the new, greater level of understanding. The title of the book takes up the main question to be addressed. Do we completely understand the Earth's polar challenges? How do we perceive and react to these challenges, and pass them along through generations from the known past to the unknown future? What lessons should be learned? What legacy will we pass on to the future? These are the central conceptual reflections covered by the collective piece of science analysis summarising the activities of over 60 nations involved in more than 200 international projects for the past 10 years of planning and implementing of the International Polar Year (IPY) 2007–2008.

The book consists of 5 major parts that individually and combined make an important contribution to broaden our knowledge and understanding of the boundless Polar science puzzle.

The authors thoroughly introduce the history of previous IPYs; and planning and implementation strategies that repeatedly emerged over the past 125 years in organisation of such a tremendous polar initiative. They look back at the initial ideas nurtured by the early polar explorers and champions during the 1882–1883 IPY, ideas of the following IPYs and up until the recent IPY. The importance of such ambitious international efforts that mobilised the science community four times during these large transdisciplinary initiatives is convincingly shown. As authors discuss: 'The historical backdrop is needed... to elucidate the factors that were critical in successful planning and implementation, ... thus the history of polar science was included as a 'bona fide' component in IPY 2007–2008' (page 5). In support of this claim, the reader has an opportunity to follow all the steps of collaborative planning efforts of the fourth IPY that brought together scientists, nations and a number of international organisations. The book introduces the reader to all the main actors that made a valuable contribution to the planning and implementation of the IPY 2007–2008: the Joint Committee, the International Programme Office, the Subcommittees and emerged IPY projects. Included in the history chapter are illustrative examples of collegial work, documentary archives, lists of various meetings and conferences, case studies, descriptions of contributions from various committees and national secretariats that all combined in a joint effort to plan, promote, implement and fund 'the major milestone in the history of science' (page 2).

One distinguishing feature of science is its universality, allowing us to follow interdisciplinary approaches and methods to address the large, existing challenges. The overview of all

scientific achievements and legacies are addressed through the five parts of the book which are structured along the main research aims as defined by the polar science community: determining the present environmental status of the polar regions; understanding of past and present environmental changes in the polar regions; understanding the links and interactions between polar regions and the rest of the globe; understanding the unknown and hidden environmental mechanisms; and understanding the human dimension in polar regions. The focus on interdisciplinarity strengthens the book.

The main part of the book is devoted to science plans along with overviews on observing systems and data management. Summaries of scientific activities and preliminary results and outcomes from both polar regions are presented to cover research highlights in the following topics: polar atmosphere; Arctic Ocean; Southern Ocean; Arctic and Antarctic ice sheets; subglacial aquatic environments; permafrost research; Earth structure and geodynamics; terrestrial ecology; and human dimension studies. It is of importance to note that IPY 2007–2008 was the first polar year that included social sciences and humanities. The book elaborates on the involvement and engagement of polar residents and communities in this polar year. Originally considered as a celebration of the 50th anniversary of the International Geophysical Year (IGY, 1957–1958), 'IPY 2007–2008 took place in a very opportune time to document and investigate changes in both Polar regions' (page 136).

Closely linked to all science plans and field campaigns, are the observational systems. The authors review the ability of existing observing systems to evaluate and meet the requirement of current and new monitoring networks. The reader is also introduced to the roadmap to the IPY observing systems legacy. To secure this legacy, the authors discuss the transition to a sustainable observing system in the post-IPY era.

The need for a more strategic approach to data and information management is emphasised and the authors pay special attention to data plans, strategy and policy. Appropriately preserved and shared data are the fundamental basis for any future science efforts. The importance of community-based monitoring and the documentation of local indigenous knowledge are highlighted in the book.

IPY 2007–2008 was an inspirational impulse that launched many educational and outreach efforts. The authors feature some of the main events that brought together teachers, students, researchers, artists, journalists, media officers, film producers, book publishers, program managers and the public. Science, then, appears as the great social equalizer.

Among others, one of the major IPY 2007–2008 legacies was the involvement and stimulation of current and future generations of polar researchers for years ahead. The nowadays active role of early career scientists in planning, promoting and implementing of research activities is increasingly realised and serves to convince the reader that the IPY messages were delivered appropriately.

Reading through the book, I concluded that most of my own polar science uncertainties had been fulfilled, yet a lot still remains to be learned in the IPYs to come. Throughout the book the authors advocate for 'certain basic principles: multidisciplinary, international cooperation, open communication, volunteer service, nurturing the next generation of scientists and collegiality' (page 628), components that are essential in any earth-scale science activity.

This book is 'the operational summary' (page xx) covering over 10 years of efforts and it critically assesses the success of the fourth IPY by investigating historical gaps and omissions in planning of the international activities. It outlines the entire and comprehensive science plan and describes the major lessons and legacies to be considered for upcoming science efforts. These are the obvious merits of this book.

This book is of special importance to space and Earth scientists, climatologists, oceanographers and cryosphere specialists, marine biologists, anthropologists, polar historians, indigenous researchers, educators, the public, government officials, media and other IPY participants. However, the authors' clear and engaging writing style makes this book understandable, even

to those who are not scientifically literate. This book could provide great supplementary reading to any polar science course at the college and university level and it could serve as an excellent resource for communicating science through education and outreach activities. 'Multifaceted and diverse, multi-vocal in its use' (page xxi), this book is a thought-provoking source for IPY practicing scientists, and a great legacy for the future generations of Earth's Polar scientists. The book can be downloaded at <http://www.icsu.org/publications/reports-and-reviews/ipy-summary>. (Yulia V. Zaika, Khibiny educational and scientific base, Faculty of Geography, Lomonosov Moscow State University, Kirovsk 184250 a/ja 59, Murmansk Region, Russia (yzaika@inbox.ru)).